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Yellow fever.—Yellow fever investigation was carried on throughout the year as opportunity occurred and as material was forthcoming. As the results of this work have already been reported in full to the Yellow Fever (West Africa) Commission a synopsis will suffice here.

Experimental yellow fever in laboratory animals.—The transmission of yellow fever to laboratory animals was described in collaboration with Dr. Harald Seidelin. Some portion of the work was done in the latter part of 1913, but it was continued and finished in 1914.

Yellow fever in guinea-pigs.—Yellow fever was transmitted to guinea-pigs by means of direct subcutaneous or intraperitoneal injection of small amounts of diluted or undiluted blood from human cases of the disease. Further, the infection was kept up in a long series of guinea-pigs, from one animal to another, by the same direct means of inoculation.

Clinical signs of yellow fever in guinea-pigs.—A febrile illness followed the injection in the great majority of the animals. The incubation period was short, varying from a few hours to two days. The course of the illness varied. Sometimes the fever was acute, at other times of a chronic type, and death occurred in a considerable number, after an interval of days in some cases and in others after an interval of weeks. Collapse occasionally took place in the acute stages and was rarely recovered from. Progressive weakness, emaciation and staring fur were the other signs observed.

Albuminuria in guinea-pigs.—It was not found practicable to collect the urine during life, but animals were occasionally killed during some stage of the illness and the urine was examined at once before post-mortem changes had set in. Except in a few cases where the disease was at an early stage, albumen was always demonstrated in the urine.

Post-mortem signs of yellow fever in guinea-pigs.—The usual post-mortem signs of yellow fever were noted, hæmorrhages and erosions in the gastric mucous membrane, petechiæ in the pericardium and pleuræ, acute nephritis, and congestion of the liver. The urine in the bladder usually contained albumen.

Paraplasma flavigenum *in guinea-pigs.*—*Paraplasma flavigenum* was constantly found in the blood of the infected guinea-pigs, sometimes as early as 12 hours after inoculation. The bodies were found as a rule during the whole course of the illness and in the early days of convalescence.

" Impression smears " from the lungs, spleen and liver (made by lightly touching the slide with a freshly cut portion of the organ) frequently showed both extra and intra-corpuscular bodies, which were thought to be advanced forms of *Paraplasma flavigenum,* and which were called " blue bodies."

Blood cultures by Bass's and by Ziemann's methods.—Five attempts to cultivate the intra-corpuscular bodies which are found in yellow fever were made. Two of the samples of blood came from human cases and the others were obtained from infected guinea-pigs. Bass's technique was followed with one portion of the sample, and Ziemann's method with the other. On one occasion, a minute quantity of guinea-pig's bile was added to the blood, as well as dextrose. The results were negative in every instance, no evidence either of growth or of multiplication being observed.

Yellow fever in monkeys.—Two monkeys were inoculated from infected guinea-pigs. The febrile reaction was short and slight. *Paraplasma flavigenum* was found in the blood for a few days after the injection. A portion of spleen excised from one of the animals showed the "blue-bodies" also.

Mosquito experiments in yellow fever.—Various experiments with *Stegomyia fasciata* were carried out in conjunction with Dr. Seidelin and Mrs. Summers-Connal. Mosquito transmission of yellow fever was attempted from sick to healthy guinea-pigs in a few instances. Regular series of mosquitoes which had fed on infected guinea-pigs were dissected and all the organs examined both in the fresh state and after embedding. Observations on the feeding habits of Stegomyia in captivity were made. It was found that the female fed sometimes during the day, at other times during the night, and that they might feed for two or three successive days and refuse to bite for a day or two thereafter.

Observations on normal and on naturally infected guinea-pigs.—The natural diseases and the conditions found in apparently normal guinea-pigs were investigated with the assistance of Dr. Seidelin and Dr. J. E. L. Johnston, with a view to controlling the actual experimental work on yellow fever. It was found that bodies similar to *Paraplasma flavigenum* occurred in the red cells in a certain number of guinea-pigs. Such animals showed no fever and no signs of illness. Blood taken from them and injected into clean guinea-pigs did not give rise to febrile disturbance, although in a few cases the intracorpuscular bodies were afterwards found in the inoculated animals. A number of these "naturally infected" and also of the inoculated animals were killed. Albumen was never found in the urine. Small petechiæ were occasionally observed in the gastric mucous membrane, and some degree of congestion of the kidney or even nephritis was noted in a small number of cases. Some apparently healthy and normal guinea-pigs which died from unascertained causes showed petechiæ in the gastric mucous membrane, acute inflammatory conditions in the kidney and albuminuria.

Possible yellow fever in native children.—Dr. J. E. L. Johnston visited Abeokuta, a large inland native town, and remained there for some days examining native children and incidentally noting if guinea-pigs were kept in the compounds. The month was July. Thirty-five native children and adults were examined. Eighteen of these were infected with malaria and in addition three of them showed forms of the parasite similar to the *Plasmodium tenue* described by Stephens, one of these having a benign tertian and the other two having a subtertian infection. Twelve out of the 35 showed intracorpuscular bodies similar to *Paraplasma flavigenum.* There were no history or signs of illness in any of these 12 children. Sixty guinea-pigs were examined. Eighteen showed Paraplasma-like bodies, and three of these were five days old born in the same litter.

Reports of human cases of fever in Nigeria for transmission to the Commission.—Thirty-one case cards giving the temperature chart and brief notes of any interesting cases of fever, other than definitely diagnosed malaria, were received, arranged and forwarded to the Yellow Fever (West Africa) Commission. Nine came from Forcados, six from Burutu, five from Calabar, four from Lagos, two from Naraguta, and one each from Yola, Kano, Jebba, Ibadan and Onitsha. They included cases of definite or doubtful yellow fever, typhoid fever, meningitis and some unclassified febrile conditions.

Post-mortem specimens from cases reported to the Commission.—Seven specimens, each of liver, spleen and kidney, were microscopically examined and reported on, also three specimens of brain, two of myocardium and one each of salivary gland, bonemarrow, lung and stomach.

"Impression smears" from the organs of two cases (the lung and spleen in one, and the liver, kidney and spleen in the other) were examined. No parasites were seen.

Blood smears received from cases reported to the Commission.—Nineteen blood films from six cases were examined. Paraplasma-like bodies were found in five and in addition two of these showed subtertian malaria rings. A differential leucocyte count was made in all the films.

Possible yellow fever carriers.—During February, when two cases of yellow fever had been notified in Lagos, Dr. Craig took blood films from seven natives, all recording a temperature of about 100° F., living in the neighbourhood of the house from which one of the yellow fever patients had been removed. One of these harboured subtertian malaria parasites, and two others showed intracorpuscular Paraplasma-like bodies.

A number of cases were reported from time to time from Forcados. Dr. Booth took blood films from 11 adults and 10 children, most of whom were suffering from slight fever. Amongst these adults two were harbouring subtertian parasites and one the quartan parasite. Three quartan infections and two subtertian were found amongst the children, whilst one presented only pigmented mononuclears, and Paraplasma-like bodies were present in another. Dr. Braithwaite sent blood smears from 10 children at Abeokuta. All had some degree of fever, one had jaundice in addition, another had albuminuria, and the eyes were suffused in a third. Six of the children were proved to harbour the subtertian parasite, and Paraplasma-like bodies were found in other three.

Malaria blood films.—No systematic blood examination of the inhabitants of any particular area for a definite period has been made. At various times, however, collections of blood films have been sent in from certain districts.

Films showing malaria from Benin City.—The largest collection, 49 in all, was sent from Benin City by Dr. Jackson Moore. Blood smears from 10 children showed subtertian parasites in five and quartan in one. There was one subtertian infection and one quartan infection in 25 native adults. Films from 14 Europeans were examined, subtertian parasites being present in one. Pathological material was also received from a fatal case of subtertian malaria in a European.

Films showing malaria from Badagry.—Dr. Suffern sent blood smears from 45 children in this district. Only two of these showed no evidence of active or recent malaria. Quartan parasites were present in 22, and subtertian rings in nineteen. The smear from one child showed both subtertian and quartan parasites, and in another child, although no parasites were seen, pigmented mononuclear leucocytes were fairly numerous. Crescents were observed in seven of the cases of subtertian infection.

Films showing malaria from Forcados.—Thirty-two blood smears were received from Dr. Booth. Thirteen of the films were from children. A subtertian infection was found in five, quartan in three, and one child showed evidence of recent malaria, the large mononuclear leucocytes containing pigment. Crescents were present in two of the subtertian cases. There were blood films from 14 adult natives, quartan parasites being present in two and subtertian in one. Smears from five Europeans showed no parasites.

Films showing malaria from Lagos.—Twenty-seven smears were received from Lagos. There were six children amongst the cases, and two of these showed a subtertian infection. Smears from three adult natives were negative. Films from 18 Europeans were examined. Seven subtertian infections were found, one benign and quartan mixed, and another case showed only pigmented mononuclear leucocytes.

Films showing malaria from Brass.—Dr. Bate sent blood smears from 24 individuals. There were 17 children in the number, of whom seven suffered from subtertian, three from quartan, and one from both subtertian and quartan malaria. Crescents were seen in one of the subtertian cases. Smears from four adult natives were negative. Two subtertian infections were found in the films from three Europeans.

Films showing malaria from Warri.—Dr. Booth sent blood films from 16 children at Warri. Subtertian parasites occurred in five and quartan parasites in one.

Films showing malaria from Ibadan.—Blood smears from eight children were sent by Dr. Hungerford. Two of these showed a subtertian infection. Films from three adult natives showed quartan parasites in one. Dr. Neale sent smears from five Europeans, in two of which subtertian malaria was found.

Films showing malaria from Yaba.—The blood was examined in 11 adult natives, all of whom showed some rise of temperature or complained of body pains. Subtertian parasites were found in three, and one of these showed crescents. Three Europeans examined showed no malarial infection.

Films showing malaria from Aro.—Dr. Braithwaite forwarded blood films from 10 children. Subtertian parasites were present in six, and crescents occurred in one of these. One native adult and one European showed no signs of active or recent malarial infection.

Films showing malaria from odd cases.—Blood smears from two children at Owerri showed that one harboured quartan parasites. Two Europeans stationed with Div. II., North Eastern Railway, showed no evidence of malaria. Three Europeans—one at Baro, another at Kano and a third at Zungeru—were also negative. One European at Onitsha was infected with the subtertian parasite.

Pathological specimens in fatal malaria.—Specimens of various organs from three fatal cases indicated that subtertian malaria was the cause of death in three Europeans. These cases were reported from Burutu, Opobo and Benin City.

Bass cultures of the subtertian parasite No. 1.—The subtertian parasite was successfully cultivated on four occasions. Case No. 1 was from an adult native (the messenger attached to the Institute). He complained of shivering and vague pains. The temperature was 101·8° F. The blood showed numerous young rings of subtertian malaria. Ten c.c. of blood were withdrawn, placed in a tube containing $\frac{1}{10}$ c. 50 per cent. dextrose, and then defibrinated. The clot was removed, the fluid placed in three centrifuge tubes and incubated at 37° C. Smears were not made until 18 hours afterwards, when numerous small ring forms, pear shaped forms and equatorial forms were seen. In 20 hours all the forms had become rounded and compact with the chromatin faintly staining. After 22 hours' incubation, the parasites filled half of the cell, auto-erythrophagocytosis was marked and a fair number of parasites were seen inside the mononuclear leucocytes. At 24 hours, the forms were distinctly larger and pigment was observable in scattered grains throughout the protoplasm. After 28 hours the pigment was grouped in the middle of the parasite, and more than half of the host cell was occupied. At 42 hours the chromatin had begun to break up and most of the parasites were in the pre-rosette stage. After 44 hours, many complete rosettes were present, others had liberated their spores and a few very young forms were seen inside the red cells. Some mononuclear leucocytes were observed to contain complete rosettes. Auto-erythrophagocytosis was well marked and there was much free and ingested pigment. It must be recorded that at each examination a certain number of parasites were noted which did not seem to keep pace with the majority in rate of growth. At the time when most of the parasites were in the rosette stage these others hardly occupied half the cell, the chromatin was scanty and the protoplasm rather faintly stained. It was concluded that these were sexual forms. At 50 hours the smears showed only young rings and these supposed sexual forms. At 68 hours crescents were noted. With regard to the patient himself, the temperature was normal after 24 hours, and did not rise again. Parasites were not found in the blood again until the fourth day, when a few crescents were seen. He was not given any quinine.

Bass culture No 2.—Case No. 2 was from an adult male leper in the neighbouring asylum. He complained of headache and "itching" over his body. The temperature was 100·4° F. Small subtertian rings were fairly numerous in the blood. The same procedure for cultivation was followed as in Case No. 1, but some tubes were kept at room temperature (21° C.–30° C.), and others were incubated at 40° C. It may be said at once that no appreciable differences were observed in the rate of growth of the parasites in the two sets of tubes. After 4 hours' incubation numerous ring, pear-shaped and spherical forms were present. After 6 hours, although a few rings were still present, most of the parasites were in the form of spheres, and pigment was observable in their protoplasm. At 8 hours, the rings had become small spheres, but most of the parasites which were in the form of spheres at 6 hours were now fairly large, occupying about half of the cell and with the pigment aggregated at one spot. The chromatin stained faintly and was scattered. At 16 hours there were still a few small ring forms and some half-grown spheres, but most of the parasites were almost full grown, with the chromatin staining very distinctly. After 18 hours' incubation rosettes were present, and some mononuclear leucocytes were seen to have ingested erythrocytes. At 20 hours all stages were seen from small rings to sporulating bodies, and phagocytosis of parasites by the mononuclear leucocytes was well marked. Thereafter the cultures were examined at short intervals up to 118 hours. A few of the second generation developed to rosettes at 52 hours, but they were smaller than the first; phagocytosis of the parasites was a marked feature and the smaller spheres with slower growth than the others progressed, but did not, as was observed in Case No. 1, develop as far as the crescent stage. The patient himself showed a normal temperature on the second day, but the parasites had not disappeared from his blood until the third day, when many pigmented mononuclear leucocytes and one phagocytosed ring parasite were seen. He was not given any quinine.

Bass culture No. 3.—Case No. 3 was from a European mate on an intermediate steamer. He was in his fourth day of illness. The temperature had been 106° F. on the third day. On the fourth day it was 101° F., albuminuria was present, there were frontal headache, suffused eyes, earache, and frequent and distressing vomiting. Numerous subtertian rings were present in the peripheral blood. On this occasion some tubes of the blood were cultivated at 40° C., others at 36° C., and others again at room temperature (21° C.–30° C.). After 5 hours' incubation the rings were distinctly larger and the vacuole had practically disappeared, and a few fine granules of pigment were present. At 7 hours the parasites were more elongated, the chromatin was faintly stained and the pigment showed signs of grouping. After 9 hours the parasites had mostly returned to the spherical shape and filled nearly half the host cell. In 16 hours growth was still more advanced and the chromatin was more distinct. It was at this time that the same two types of parasite became noticeable, the one small and compact and slow growing, presumably the sexual form, and the other larger and more actively growing, the asexual or segmenting form. At 19 and 21 hours, all stages from half grown parasites (sexual) to large forms in the pre-segmenting stage were present. At 23 hours well marked rosettes were found containing 6 to 8 spores. At 25 hours the spores had further subdivided and numbered from 24 to 32 in most cases. At

27 hours most of the sporulating bodies had ruptured, many red cells contained young rings and a fair number of the sexual forms were seen. No auto-erythrophagocytosis was observed, nor phagocytosis of the parasites. From this time up to 89 hours no further evidence of growth was observed, and degeneration of the parasites proceeded rapidly. This patient had had an intramuscular injection of quinine on the third day of his illness.

Bass culture No. 4.—Case No. 4 was from an adult male leper. He complained of vague and slight body pains. The temperature was 98·8° F. The blood showed scanty subtertian rings. On this occasion one set of tubes was incubated at 39° C., another at 34° C., and a third at room temperature (21° C.–30° C.). After 3 hours' incubation, the rings were larger. After 6 hours the vacuole had disappeared and grains of pigment were observable. At 9 hours the spherical parasites occupied more than half of the host cell and at 14 the pigment was definitely collected into an irregular mass. At 19 hours most of the parasites appeared to be full grown, and in some the chromatin was dividing. At 22 hours the division of the chromatin had increased, and after 23 hours rosettes were present. The same two types were observed as in the other experiments—the sexual and the asexual forms. After 26 hours most of the sporulating bodies had burst and there were numerous spores, both free and in the red cells. It was at this time that it was observed that in the tubes incubated at 34° C. and in those kept at room temperature the average size of the sexual parasites was smaller than in the tubes incubated at 39° C. After 33 hours, auto-erythrophagocytosis and phagocytosis of the parasites was noticeable. After 42 hours degeneration was observable in most of the parasites. After 47 hours, a few fresh rosettes were present. These probably proceeded from some of the slower growing parasites which were thought to be gametocytes. At 55 hours all the parasites were more or less degenerated, more so in the tubes incubated at 39° C. than in the others, and similar conditions were found at 68 and 99 hours. No crescents were seen. The patient himself showed a few parasites in the peripheral blood up till the third day, and also auto-erythrophagocytosis, but the temperature remained normal. He received no quinine.

Comparison of the cultures.—The parasite was of the same species in all four cases. Ingestion of red cells and of parasites (at all stages) by the large mononuclear leucocytes was a marked feature in the cultures from the three natives, and was conspicuously absent from the culture of the European blood. No quinine had been administered to the natives. The marked agglutination of the sporulating bodies described by J. G. and D. Thomson (*Annals of Tropical Medicine and Parasitology*, Vol. VII., No. 4, December, 1913, pp. 509-524) was not observed in the three cultures from the natives, but there was a slight tendency to agglutination in the case of the European.

Indications from Bass cultures.—Ordinary room temperature in this part of the tropics is apparently quite suitable for the growth of the parasite by Bass's method of cultivation, when the tubes are kept in the dark. The occurrence of phagocytic phenomena in the cultures from all three natives, and the absence of these phenomena in the culture from the European support the contention that the adult native has some degree of immunity to malarial infection. This partial immunity enables him at times to recover from the infection without the use of quinine. All three natives have been under observation for over six months since their attack, and no relapse or reinfection has followed. The statement by J. G. and D. Thomson in the paper above alluded to, that the pigment in subtertian parasites (*Plasmodium falciparum*) collects into a definite mass at an early stage of growth, is confirmed by the results obtained at the Institute.

The appearance of crescents in the culture tubes has apparently not been previously described, and but slight reference has been made in the literature to the marked phagocytic phenomena which were noted in the present cases.

The value of Bass cultures in a negative diagnosis.—The blood of two other natives was cultivated by Bass's method. Both of these individuals were suffering from febrile disturbance, headache and muscular pains. No parasites were seen at any time in the smears made from the cultures, and it was concluded that the fever was due to some cause other than malaria.

Monkey malaria.—Three young monkeys, at the beginning of the year, were found to harbour malarial parasites. A short note was written, in collaboration with Dr. Seidelin, and it was published in the *Annals of Tropical Medicine and Parasitology*, Vol. VIII., No. 1, April, 1914, pp. 81–82. The noteworthy features were that the parasites were scarce and that the majority of the forms were gametocytes. The pigment in the fresh state was bright yellow in colour ; stained by Giemsa's method it had a brilliant green appearance. Thereafter 14 other monkeys were received at the Institute, but only one of these showed parasites (*Plasmodium*, Sp. ?).

Bass cultures of monkey malaria, first experiment.—The outstanding feature of the infection in all four monkeys was that after repeated examination no parasites undergoing schizogony were seen. In fact very few forms intermediate between small ring parasites and full grown gametocytes were observed. From what is known of the life cycle of the human Plasmodia, either schizogony or parthenogenesis was taking place in the internal organs. Monkey No. 353 showed the largest number of parasites in the peripheral blood, and accordingly cultures were made both by the Bass and the Ziemann method from this animal. For the latter method, goat's serum inactivated for one hour at 45° C. was used, and the leucocytes were removed by means of the centrifuge. Both sets of cultures were incubated at 38° C. No difference in the appearance of the parasites or in the rate of growth was observed in the two methods. After 8 hours' incubation ring forms and gametocytes and what were apparently gametes were observed, but remarkably few forms intermediate between these extremes were observed. The appearances were similar after 13 hours, 18 hours, 23 hours, 28 hours and 33 hours. At 38 hours the gametocytes were fewer than previously, but again at 43 hours they were numerous ; young forms were also numerous at that time, but after 48 hours only a few rings were seen and gametocytes and gametes predominated. At 61 hours and 85 hours only gametes and gametocytes were found. At 94 hours, one young form with two chromatin dots was seen in addition to numerous gametocytes. Thereafter at 101, 111, 115, 121, 131, 137, 146, 157, 163, 169, 179, 185 and 195 hours, young forms were not again seen, and the gametes and gametocytes became progressively fewer in number. It will be seen that young ring forms were constantly present up till 48 hours' incubation, when they disappeared rapidly. There were never sufficient intermediate forms to account for the growth of the parasites up to the gametocyte stage, and the conclusion seems unavoidable that growth did not take place to any marked extent. Yet the parasites were remarkably fresh and active throughout the first three days. No phagocytic phenomena were observed in the Bass cultures.

Bass cultures of monkey malaria, second experiment.—The second experiment was made six months after the first. During that interval the monkey had undergone an eight days' course of intramuscular injection of quinine. This treatment had somewhat reduced the number of parasites at the time, but they became as numerous as ever shortly afterwards. Three and a half months elapsed between the quinine administration and the second experiment. Bass's method only was followed on this occasion, but the leucocytes were removed from one set of tubes and allowed to remain in the other. The incubation temperature was 40° C. No difference was observed in the parasites in the smears from the two sets of tubes. After 4 hours' incubation most of the parasites were full-grown or nearly so, and both the large mononuclear and the polymorphonuclear leucocytes contained a good deal of pigment. At 8 hours young forms, including rings, were more numerous again. At 12 hours the gametes and gametocytes still preponderated in number but there were numerous younger parasites. Many gametes appeared to be very active, throwing out pseudopodia. At 20 hours, 24 hours, 28, 32, 36, and 44 hours the appearances were still similar, but at 48 hours young forms were again more numerous. At 53, 58 and 69 hours the full grown forms once more predominated. On this occasion, thus differing from the first experiment, all stages of growth of the parasite were seen, and were in fair number, but as in the first experiment no trace of division of the parasites was seen.

These results, incomplete and inconclusive as they are, are given for the purposes of the Annual Report of work done.

Mosquito experiments with monkey malaria.—Stegomyia fasciata, Culiciomyia nebulosa, Ochlerotatus irritans, O. nigricephalus and *Anopheles costalis* were all used in feeding experiments in an attempt to find the insect host of monkey malaria. All these insects fed, Stegomyia and Anopheles with avidity and the others with difficulty. At regular intervals after feeding a certain number were dissected and others made to feed on clean monkeys. No success was obtained. No developmental forms were ever found in the organs of the mosquito, and the clean monkeys did not become infected.

Effect of quinine on monkey malaria.—Monkey 404, a young *Cercopithecus* Sp.? showed a few gametocytes in the blood on 8th March, 1913. Half a grain of quinine hydrochloride was injected intramuscularly each day for eight days thereafter. On the ninth and tenth days the dose was increased to 1 grain and on the tenth day 2 grains were given. A few gametocytes were present on 11th March and on 16th March, but no parasites were seen on 20th March, that is after the animal had received 6 grains of quinine, but on 30th March the gametocytes reappeared.

Monkey 353, a large *Papio sphinx,* showing numerous rings and gametocytes in the blood, received quinine hydrochloride intramuscularly in the following doses: 15th April, 1 grain, ditto 16th April, ½ grain 17th April, 2 grains 20th April, 1 grain 21st April, and 2½ grains 23rd April; 8 grains in all, during a period of nine days. The parasites became fewer in number during the treatment, but shortly afterwards they were as numerous as ever.

Blackwater fever.—This disease forms the subject of a separate report. Blood smears from six cases were received. In three of these cases, two at Ibadan and one at Onitsha, the films were taken during the first day of the hæmoglobinuria, and subtertian parasites were found in all three. Of the remainder, the blood was examined on the second day in two and on the third day in one, and parasites were not found in any of these. Specimens from two fatal cases were received. The usual signs of the disease were found in the organs.

Ulceration of the fauces in blackwater fever.—Dr. Neale reported an unusual complication in blackwater fever at Ibadan. In three consecutive cases of the disease, he noticed an ulcerated condition of the fauces, foul smelling and acute. The parts involved were at the base of the anterior pillars of the fauces. The ulceration was deep and tended to spread rapidly. The systemic disturbance appeared to be profound, and the condition seriously prejudiced the patients' chances of recovery. Smears and cultures made from the ulcer, in the third case of the series, showed *Staphylococcus albus* and *citreus,* the *Pneumococcus* and various yeasts.

Dysentery.—Specimens of the fæces from 14 cases of amœbic dysentery were examined. Three of the specimens were from Europeans, and all three showed Entamœbæ, free and encysted, along with numerous pus cells and red blood corpuscles. In a specimen of the fæces from a fourth European who had been under treatment for some weeks with emetine, no amœbæ were found. Dr. Gibson sent samples of the fæces from 14 native prisoners, all of whom suffered from diarrhœa. Amœbæ, pus cells and erythrocytes were observed in 11 of these.

Flagellated protozoa were found in the fæces of two natives, one sent from Baro, the other occurring at Yaba. Diarrhœa of a somewhat mild type was present in both cases. Some pus cells, but no red blood corpuscles, were seen in the smears. The flagellates themselves were active, and they appeared to possess three cilia at the blunt end of their pear-shaped body. The material was insufficient for a definite identification.

Sputum from a case of liver abscess which had ruptured into the lung was examined.

Specimens of fæces from six natives at Benin City and from 10 natives at Ebute Metta showed no *Entamœba tetragena.*

Dysentery in cats.—Dysentery in two cats was investigated. One animal died, the other recovered. No amœbæ were found in the stools of either. The cat which died came from a house where several cases of dysentery amongst Europeans had occurred some weeks previously. Post-mortem: there was no ulceration of the large intestine, but the mucous membrane was pink, soft and spongy.

Dysentery in goats.—An epidemic of dysentery amongst goats occurred at Yaba. Seven animals died after an illness of a few days, during which the motions were frequent and contained much blood and mucous. Numerous active flagellates were present. They resembled *Trichomonas.*

Trypanosomiasis.—Blood smears from three cases of human trypanosomiasis were examined. One of the cases was in a European and the other two in natives. Trypanosomes of the *gambiense* type were present in all. One of the native cases was fatal, and the brain showed the typical signs of the disease, microscopically. The other native was one of the servants attached to the Institute. He complained of fever one evening, and a blood film made at the time showed numerous trypanosomes. He was given 2 grains of atoxyl, and decamped on the following day.

Trypanosomiasis in pigs.—Blood smears from 126 pigs have been sent in from various stations, *T. pecorum* was found in 12 of these. Eight infected animals came out of 46 from the Aro District (Aro, Itori, Owowo and Abeokuta), at all of which places there are stations of the Nigerian Railway. Three out of 13 pigs were infected at Ifon (Benin City district), Central Province. Smears from seven pigs at Ikot Ekpene were received, and one showed trypanosome infection (Eastern Province). Smears from 14 pigs at Benin City, 10 at Ibadan, 10 at Forcados, eight at Wasimi, six at Opobo, six at Calabar and six at Badagry were negative.

Trypanosomiasis in dogs.—Blood films from 22 dogs have been examined. Seven of the animals proved to be infected with a trypanosome of the *brucei* type. Three of these infected dogs (out of 11) came from Lagos, three from Benin City and one from Itu. Five from Aro and two from Ibadan showed no trypanosomes. Post-mortem material from another dog, at Afikpo, was received at the Institute. The results of the microscopical examination pointed to a diagnosis of trypanosomiasis.

Trypanosomiasis in cattle.—Trypanosome infection appears to be very common in cattle. Messrs. Miller Brothers, Ltd., brought a large herd of cattle down to Lagos from the Northern Provinces. A number died on the journey, and when the remainder arrived in Lagos deaths became very numerous. The firm kindly handed over what was left of the herd (54 animals) to the Institute, with a view to finding the nature of the illness and to taking remedial measures. Trypanosomes (*T. vivax*) were present in 44, and 15 of these harboured babesia in addition. The disease was too far advanced for successful treatment, and all the animals died within a few weeks. The following account gives the details of the treatment of three of the animals, with atoxyl and salvarsan. Two of these were found to harbour trypanosomes alone, the other babesia in addition. The latter, 42A, was given an intravenous injection of 606 (grms. 6), followed six days later by a similar dose. After the first (12th November) the temperature rose the same evening from 101·6° to 103·4° F., falling the following morning to 101·7° F., remaining constant thereafter till the morning of the fourth day, when it rose to 103·2° F., gradually falling again to 101·6° F., when the second dose was given. On this occasion there was a fall in the evening temperature to 100·6° F., and thereafter a morning temperature of 101° F. and an evening of 100° F., until the evening of the fifth day (since the second dose), when it suddenly rose from 101·6° to 103·2° F., after which the temperature became more irregular, generally showing an evening rise of 1 or more degrees. The supply of salvarsan being limited, no further treatment was carried out, and the animal died on the 7th December, that is, 25 days after treatment was first commenced. The blood was examined on the morning of the 12th November, when trypanosomes and babesia were present in large numbers. The following morning there was a marked decrease in the numbers of both parasites, especially so in the babesia. It was not till the 15th November (Temp. 103·6° F.) that the trypanosomes again began to increase. An increase in the babesia was scarcely noticeable on the 18th November, the day after the second intravenous, there was again a marked decrease in the parasites. As before, the decrease was more noticeable in the babesia, the decrease in both being more marked than after the first intravenous injection. The improvement continued till the 21st November, when the evening temperature rose from 101·6° to 103·2° F. The next morning the temperature was 102° F., the trypanosomes were again found to be increasing, and no great difference was noted in the number of the babesia. The day before the animal died the blood showed a large number of trypanosomes and relatively few babesia. Throughout the treatment the number of trypanosomes was never so numerous as before this was commenced, whereas the number of babesia after the second intravenous injection steadily decreased.

The two other cases (41A and 43A) were treated with atoxyl. No. 41A was given 9 grs. of atoxyl on four different occasions, namely, the 9th, 14th, 20th and 25th November. After the first dose the temperature showed no variation until the evening of the 11th, when it rose from 101·2° to 104·6° F. On the 14th the morning temperature had fallen to 100·4° F., rising the same evening to 103·2° F.; after this, up to the 19th, the evening temperature remained lower than the morning. On the 20th November the third dose was given, the evening temperature rising from 101° to 102·4° F.

The following daily temperatures up to the 23rd November show an evening rise above that of the morning. The temperature after the last dose, given on the 25th, showed an evening rise from 101° to 102·2° F. From this day up to the time of death (30th November) the evening temperature remained higher than the morning.

In this case there was no marked diminution of the parasites till after the third dose. This was administered on the 20th November. On the following day a marked lessening in their number was noticed for the first time. This improvement did not continue. On the 25th November (when the last dose was given) the parasites were again increasing. On the 27th the animal was unable to rise after lying down, and on the 30th November death occurred.

The last blood film showed a larger number of trypanosomes than the one taken before treatment was commenced, No. 43A. On 14th November 20 c.c. of serum, previously removed from No. 41A, and heated for 1 hour at 45° C., was administered intravenously, followed shortly after by 8 grs. of atoxyl. The evening temperature was practically the same as the morning, that is 102° F. After this it gradually rose to 104° F. on the 15th November, again falling to 103·6° F. on the morning of the 17th, with a sudden evening drop to 99·4° F. It remained at 100° F. on the 18th November, and on the day following 102·4° F., when 8 grs. of atoxyl were given, the temperature rising the same evening to 103·4° F. and again 103° F. on the following morning. Thereafter till death, on the 24th November, the morning temperature remained on an average at 101° F., with an evening rise of 2 or 3 degrees.

The effect of the serum on the trypanosomes was to increase their numbers, which remained high till after the second dose of atoxyl, when there was a slight decrease in numbers on the following day. The animal was however in a very weak state and was unable to rise after the 22nd. Just before death the parasites had again increased, the numbers being in excess of those found previous to the treatment.

In these experiments all the animals were in a very weak state, their blood swarming with parasites. It was therefore hardly likely that recovery could be expected as a result of treatment. Blood smears from two bullocks at Abakaliki were examined and both showed an infection with *T. vivax*.

Ten goats, one ram and one horse showed no trypanosomes in the blood.

Ankylostomiasis.—It is possible that Ankylostomiasis in the sense of a grave and often fatal illness exists in West Africa to a greater extent than is generally known. Dr. G. E. H. Le Fanu believes from his own experience that many fatal cases occur, and that the disease presents an important problem to the sanitarian. It is certain that a very large percentage of the natives harbour ankylostomes, and also that Europeans not infrequently become infected. The adult worm can be found in most cases in the post-mortem room, and the ova can be seen in most samples of fæces. Specimens of the fæces from 10 native police constables at Ebute-Metta were examined. Ankylostome ova were present in all. Smears from the fæces of 10 natives at Benin City were examined (the smears were dry and the material was scanty), and ankylostome ova were found in six. Thirty of the inmates of the Lunatic Asylum at Yaba were examined, and 27 were proved to harbour ankylostomes.

Dr. Hungerford sent from Ibadan a specimen of fæces from a native showing ankylostome ova, from which the embryos had hatched within an hour after defæcation.

Dr. Booth sent a collection of adult ankylostomes from a native at Warri.

Filariasis.—All the blood smears which have been previously noted as having been searched for malarial parasites were also examined for filarial embryos. They were all thin films, and probably filarial embryos would have been observed more frequently had the films been thick. Seven cases of *Loa loa* infection in natives and one in a European were found from Benin City, and also one case showing embryos of *Acanthocheilonema perstans.* From Forcados, one case showed *Loa loa* embryos, another *Acanthocheilonema perstans* embryos, and a third was infected with both these filaria. All three were natives. Two adult natives at Yaba and one at Ibadan were the hosts of *Acanthocheilonema perstans.*

Typhoid fever.—Nine Widal reactions were done during the year, but only one gave a positive reaction. This case came from Forcados. There was a case-card and history of another possible case of typhoid fever in that town, the patient being a native. Post-mortem specimens were received from a fatal case in a native at Kaduna.

Each sample of blood sent to the Institute for the Widal reaction was put up in varying dilutions, with *B. typhosus*, *B. paratyphosus A.*, *B. paratyphosus B.*, and *M. melitensis.*

Syphilis.—The Wassermann reaction was done in six cases, all of which were positive. Smears from 21 hard sores were examined, and the *Treponema pallidum* was found in 13. The other pathological material examined included smears from multiple sores in a native, which were negative, and smears from a rupoid eruption, which were also negative, but in this case a Wassermann reaction was positive. A piece of tissue from an ulcer on the leg showed signs of a syphilitic origin, and post-mortem material from a native showed chronic cirrhosis of the liver and a gummatous pericarditis.

Gonorrhœa.—Smears from the urethral discharge in eight cases were examined, and gonococci were found in all. A vaccine was made for two of the cases.

Tuberculosis.—Seven specimens of sputum were examined for tubercle bacilli. The finding was positive in one European and two natives from Lagos, and negative in four natives, two from Brass and two from Lagos. Post-mortem material was obtained from four native cases, three in Lagos and one in Forcados. Two of the Lagos natives showed a general miliary tuberculosis. The third case in Lagos was in a Krooboy who had been steadily at work up till the day of his death. At the post-mortem very advanced *Phthisis pulmonalis* was found, with large cavities in the lungs. Dr. Sapara, who performed the autopsy, remarked on the endurance and lack of complaint which the Krooboy had shown. The case at Forcados was one of tubercular meningitis. Tubercle bacilli were found in the cerebrospinal fluid.

Tubercle bacilli were also obtained from the tonsils in a native case in Lagos, where there were cervical adenitis and enlarged tonsils.

Skin diseases, abscesses, etc.—Smears and an agar culture were sent from two cases of pustular eczema in Europeans. *Staphylococcus albus* was found and a vaccine was made. From another case of boils, *Staphylococcus pyogenes* was found and a vaccine was prepared. Two pieces of skin tissue were examined, one from a chronic eczema and the other from the edge of an ulcer. Syphilis was negatived in the former and malignancy in the latter.

Pus from a sloughing wound in the hand was examined for the tetanus bacillus with negative result.

Throat Condition.—The throat condition found in a case of blackwater fever has already been referred to, as has also been the finding of the tubercle bacillus from the tonsils in a native in Lagos.

A throat swab from a case of membranous exudate very like diphtheria clinically was received from Kano. A few diphtheroid bacilli were observed in the smear, but a serum agar culture was inconclusive. A guinea-pig was intraperitoneally inoculated with a broth culture of the short bacilli grown on the serum agar. The animal died in four days, and at the post-mortem there was general œdema, excess of fluid in the peritoneum, petechiæ in pleuræ and peritoneum, and intense hæmorrhagic congestion of the adrenals. Sections of the kidney showed intense nephritis. Cultures from the heart blood and from the adrenals were negative and cocci were isolated from the peritoneal fluid.

Another guinea-pig inoculated in the palpebral conjunctivæ showed no reaction.

Sections of the original membranous exudate showed no gram positive bacilli.

Tumours.—The complete tumour mass or portions of it were sent from 14 cases. These were all from natives. They included a fibroma (finger), a fibro-chondro-adenoma (cheek), and a rodent ulcer (face). There were three sarcomas from the foot, a fibro-sarcoma, a spindle-celled sarcoma and a melanotic sarcoma. There were three scirrhus cancers, one from the testicle, one from the male breast and one from the female breast. The other tumours were a sarcoma of the kidney, an osteo-sarcoma (pelvis), an alveolar sarcoma (axillary lymph gland), a spindle-celled sarcoma from the calf of the leg, and a round-celled sarcoma in the posterior abdominal wall.

Urine analysis.—Two samples of urine were received from a European who suffered from cystitis. The infection was due to *B. coli.* Three samples of urine were obtained from a European who exhibited hæmoglobinuria after quinine, but no other signs or symptoms, so that the condition could not be called blackwater fever.

Estimations of the amount of sugar in six samples of urine were made. Three other specimens of urine showed only albumen and another was normal.

Poisoning.—Two samples for analysis were received. One was from the scrapings of a soup pot, the contents of which were suspected of being poisoned. The other specimen was from the stomach contents, in a fatal case. No poisonous alkaloids were found in either case.

Post-mortem material from various sources.—Pieces of the liver from a native were forwarded to the Institute. They contained encysted Porocephalus larvæ. They apparently had no influence as a cause of death. The case occurred at Ibadan. Specimens from a fatal case of measles with hyperpyrexia were received from Forcados. The spleen showed intense hæmorrhagic congestion, the kidneys were the seat of acute nephritis and the brain showed great engorgement of the capillaries. Material from two cases of general arterio-sclerosis, one of pyæmia, one of sunstroke, one of lobar pneumonia and one of broncho-pneumonia were examined. Specimens were also received from a case which might have been ankylostomiasis, and from another case in which ascites was a prominent feature and the liver and spleen were found to be densely adherent.

Babesiasis.—All the animal blood smears which were examined for trypanosomes were also searched for babesiæ. One dog and one bullock from Lagos showed babesia (*B. canis* and *T. parva*) and one pig from Aro (*B. Sp?*).

Dr. Johnston carried out an investigation on babesiasis in cattle, and his notes are given here :—

“ During a recent tour in the neighbourhood of Kaduna, N. Nigeria, “ I obtained 150 films from cattle, and 12 from sheep.

“ Of the latter, one showed a bacillary-shaped babesia. Of the “ former, babesiæ were to be seen in no less than 39, or 26 % of the whole. “ These were of various types, many of which strongly resembled the “ various forms of Paraplasma.

“ Some were large, pyriform bodies, often with two chromatin dots, “ or several minute chromatin granules ; some were fairly large rings, “ with well-marked chromatin, often the rings were extremely minute. “ Occasionally, *e.g.* in film 99, there was a large, more or less confused “ mass of protoplasm and chromatin, which in some cases could be seen “ to consist of more than one parasite. Bacillary forms were common, “ as were thicker forms intermediate between the bacillary and ring- “ shaped types. These various types occasionally occurred in one film.

“ But apparently not one of these infected cattle was in any way ill, “ though one of them (No. 110) also showed trypanosomes.”

Theileria parva ?—Amongst the herd of cattle supplied by Messrs. Miller Bros., Ltd., there were found two animals showing only babesiæ, and 15 others which suffered from both babesiasis and trypanosomiasis.

Bass culture of Theileria *No. 1.*—Bass cultures were made from one of the animals in the usual way, the incubation temperature being 40° C. The parasite, following Castellani and Chalmers (*Manual of Tropical Medicine, 1913*, p. 368), was *Theileria* (cytoplasm easily visible, division in fours, nucleus without dimorphism, bacillary forms present).

Cow No. 17, which was the animal from which the blood was taken for cultivation, showed a somewhat scanty infection with *Theileria*. Most of the forms of the parasite were minute and rounded, only a few bacillary forms being seen. No trypanosome were found. After five hours' incubation there were seen in addition to bacillary, rounded, pear-shaped and vibrio-shaped forms, a number of rounded bodies which contained four chromatin masses, arranged for the most part in the form of a cross, thus ⁘, but in a few instances arranged thus ˙:˙, whilst other parasites contained only two chromatin masses. At 10 hours the forms dividing into four were more numerous, and the other forms had grown more rounded. It was also observed that the bacillar forms were thicker and more like a cocco-bacillus. At 13 hours the four chromatin dots had separated and there was evidence of separate cytoplasm around each mass of chromatin. At 20 hours, whilst there were still a few of the parasites which showed the early stage of the division of chromatin, in most cases the bodies were widely separated, and many erythrocytes were seen to contain four, six or eight minute *Theileria*, whilst other red cells had evidently become freshly infected with single or multiple young spores. At 23 hours the smears showed mostly larger spherical and bacillary forms, and few bodies in a state of division. At 28 hours again there was a much larger proportion of dividing forms. At 32 hours the chromatin masses in the dividing forms were beginning to separate. At 38 hours most of the forms were separate and non-dividing, sometimes three and sometimes four babesiæ being present in one cell, but for the most part only one or two in each infected corpuscle. At 44 hours large pear-shaped and spherical forms were most numerous. At 50 hours there were again a few dividing forms, and a number of the single forms were swollen and apparently degenerated. At 61 hours freshly dividing forms were still present, but for the most part the parasites were large, with a single nucleus pear-shaped and spherical forms predominating, with only a few bacillary forms.

Bass cultures of Theileria *No. 2.*—The same procedure was repeated with blood from the same cow, on the day following the first experiment. After 2 hours' incubation, spherical and bacillary form of the parasite predominated, and the *Theileriæ* were mostly single in the host cell. At 4 hours the appearances were the same as before, but a few dividing forms had appeared. A few trypanosomes were also observed for the first time, and erythrophagocytosis had taken place to a slight extent. At 6 hours, many dividing forms were observable, most of them with four chromatin divisions. At 8 hours the red blood corpuscles showed a large infection with small spores, dividing forms were few, large spheres and bacillary forms being still numerous. There was mostly one or at most two parasites in each infected cell. At 14 hours the great majority of the red cells were infected, some containing large single forms in addition to dividing forms. All stages of the parasite were seen, rings, pears, spheres, bacillary and cocco-bacillary forms. At 16 hours the individuals resulting from the dividing forms were mostly separate, and each with its cytoplasm distinct. At 18 hours there was again a large number of forms in the early stages of division. At 20 hours these dividing forms had completed the process, many red cells showing a fresh infection with young parasites. At 31 hours there were as a rule two or three parasites in each infected cell, and most of the forms were large, bacillary and pear-shaped being the commonest. At 40 hours single forms of medium size predominated. At 44 hours the individual parasites were larger, and there were a few new division forms. Some swollen and degenerating parasites were noted. At 48 hours there was again a fair number of fresh corpuscles newly infected, but degenerative signs were more marked. At 61 hours a large proportion of the parasites was degenerated.

The cultivation of the parasite enabled its nature to be established with more certainty than could have been done by examination of smears from the peripheral blood.

Schizogony took place several times during the first 48 hours; thereafter degenerative changes set in.

It would appear that the fine bacillary or vibrio-shaped forms grew into the more swollen cocco-bacillary parasites which did not show any division of the chromatin. Presumably these were the gametocytes. Attempts to transmit the infection to guinea-pigs by intraperitoneal and subcutaneous inoculation failed.

Water analysis.—With the exception of one complete chemical analysis and one analysis for the presence of lead, all the samples were submitted to bacteriological examination only. It will suffice to tabulate the results in the order in which they were obtained during the year.

Well, Native Prison, Kano	*B. coli* in 1 c.c.
Well, Ogoja	*B. coli* in 1 c.c.
Well I., Port Harcourt	No *B. coli* in 10 c.c.
Well II., Port Harcourt	*B. coli* in 1 c.c.
Well III., Port Harcourt	*B. coli* in 1 c.c.
Well IV., Port Harcourt	*B. coli* in 1 c.c.
Well, Police Barracks, Lagos	*B. coli* in 0·1 c.c.
Water Supply, Calabar	*B. coli* in 0·5 c.c.
Water Tap, Native Hospital, Calabar ...	*B. coli* in 1 c.c.
Soda Water Factory, Ebute-Metta	No *B. coli* in 50 c.c.
Soda Water Factory, Lagos	*B. coli* in 1 c.c.
Soda Water Factory, Lagos	No *B. coli* in 1 c.c.
Soda Water Factory, Lagos	No *B. coli* in 1 c.c.
Well, Ebute-Metta	No *B. coli* in 1 c.c.
Water Supply, Native Hospital, Calabar ...	No *B. coli* in 1 c.c.
Water Supply, Native Hospital, Calabar ...	*B. coli* in 1 c.c.

Bacillus isolated from water.—Dr. H. Andrew Foy sent an agar slope and a Conradi Drigalski plate of a culture of a bacillus isolated from well water at Kano. The bacillus was a motile rod-shaped organism with rounded ends. There was only one flagellum—terminal. It was gram-negative. Indol was formed in peptone water, in small amount, after a few days. Acid but no curdling was produced in litmus milk, raffinose, maltose, mannite, galactos, salicin, arabinose; saccharose and dulcite were unaltered, but acid, and no gas, was produced in glucose and levulose. Agglutinating sera were obtained from guinea-pigs inoculated with killed cultures of *B. typhosus, paratyphosus A* and *B*, and this bacillus in question. The agglutination reactions were :—

	B. Typh.	*Para. A.*	*Para. B.*	*Foy's B.*
Typhoid serum ...	+	−	−	−
Paratyph. A serum ...	−	+	−	+
Paratyph. B serum ...	−	−	+	−
Foy's bacillus serum ...	+	−	−	+

As the bacillus therefore did not conform to the tests for any of the well-known organisms its identity has remained undetermined.

Organisms isolated from urine, fæces and well water.—Dr. Foy also sent a series of cultures of various organisms for confirmation or identification, which he had isolated either from patients suffering from diarrhœa at Kano, or from well water in the town. These bacilli included *B. typhosos* from urine, *B. paratyphosus A.* from fæces and from well water, *B. coli* from well water, *B. pyocyaneus* from fæces and from well water, and *B. cloacæ* from fæces and from well-water.

Entomology: mosquitoes from Lagos.—Dr. Dalziel sent regular collections of mosquitoes obtained from Lagos and its neighbourhood. During April, about 50 specimens were received. These were *Anopheles costalis, Culex consimilis, C. invidiosus. C. duttoni, C. univittatus, C. guiarti, Ochlerotatus nigricephalus,* all obtained in officials' bungalows, and *Stegomyia fasciata, Culex decens, Ochlerotatus caliginosus, O. domesticus* and *O. ochraceous* bred out from larvæ got in crab-holes.

During May, 56 specimens were identified. *O. irritans* and *O. nigricephalus* obtained at the Health Office, *Culiciomyia nebulosa* (bred from a pot of native medicine) and *Uranotænia annulata,* and *Culex thalassius* bred from larvæ in crab-holes.

In June, 188 mosquitoes were examined. They included *Culex thalassius* (crab-holes), *C. salisburiensis, C. insignis* (crab-holes), *C. invidiosus, C. tigripes, C. duttoni* and *C. consimilis, Ochlerotatus irritans, O. nigricephalus, O. punctothoracis* (these last three from larvæ in crab-holes), *O. cumminsi, Tæniorhynchus metallicus, T. aurites, Culiciomyia nebulosa, Uranotænia annulata, Anopheles umbrosus, Mansonioides africanus* and *Banksinella punctocostalis.*

During July, 152 mosquitoes were identified. *Culex quasigelidus, C. tigripes, C. thalassius, C. insignis, C. decens, C. fatigans, C. rima* (the last five from crab-holes), *Anopheles mauritianus, A. umbrosus, A. costalis, Ochlerotatus argenteopunctata, O. nigricephalus, O. punctothoracis, Uranotænia bilineata* var. *fraseri, U. annulata, Mansonioides africanus, M. uniformis, Tæniorhynchus annettii, Stegomyia luteocephala, S. fasciata,* and *Culiciomyia nebulosa.*

In September, *C. decens, C. quasigelidus, C. invidiosus, C. rima, Ochlerotatus irritans, O. nigricephalus, Uranotænia balfouri, U. bilineata* var. *fraseri, Anopheles umbrosus, Stegomyia fasciata* and *Culiciomyia nebulosa* were identified. During October there were obtained *Culex decens, C. tigripes, Stegomyia luteocephala, Ochlerotatus irritans, O. nigricephalus, Hodgesia sanguinis, Uranotænia bilineata* var. *fraseri* and *Culiciomyia nebulosa.*

Mosquito larvæ from Lagos.—Dr. Dalziel also sent up samples of larvæ found by the Sanitary Inspectors during their rounds. A table is appended giving details. It will be seen that the larvæ of ten species were obtained. These were, in their order of frequency, *Stegomyia fasciata, Culiciomyia nebulosa, Anopheles costalis, Ochlerotatus irritans, Culex decens, C. tigripes, C. duttoni, C. insignis* and *C. grahami.*

The larvæ of two known insect-carriers of disease (*Stegomyia fasciata,* yellow fever; *Anopheles costalis,* malaria) were very common. *Cyclops* (carriers of guinea-worm) were also found. The stegomyia larvæ, when they were found with other species, were most commonly associated with *Culiciomyia nebulosa,* and in order of frequency with Psychodids, *Anopheles costalis* (in wells) and *Ochlerotatus irritans* (in crab-holes). The stegomyia larvæ were found in agbo-pots, barrels, basins, buckets, holes in banana trees, canoes, crab-holes, catchpits, cocoa-nut shells, drums, drains, gutters, jugs, pools, pots, swamps, tanks, tins and wells.

Glossinæ from Lagos.—Dr. Best sent two specimens of *Glossina palpalis* caught in his bungalow in Lagos, and several were caught at the Institute.

Fleas from Lagos.—Dr. Dalziel sent fleas at intervals, from rats caught in Lagos. All the insects were *Xenopsylla cheopis.*

Flies from Opobo.—Dr. Macfarlane, Dr. Ellis and Capt. Walker, D.S.O., sent numerous collections. They included *Tabanus secedens, T. obscurehirtus, Chrysops longicornis,* Chironomids, *Eristalis,* Dolichopodids Empipids, *Glossina caliginea, G. palpalis, Anopheles costalis, Culex decens, C. grahami, C. rima, C. fatigans, C. invidiosus, Culiciomyia nebulosa, Stegomyia africana* and *Stegomyia fasciata.*

Flies from Forcados.—*Culex fatigans, C. decens, C. invidiosus* and *Anopheles costalis* were received from Forcados.

Flies from Calabar.—*Glossina palpalis, Tabanus socialis, T. besti* and *Culex albovirgatus* were forwarded from Calabar.

Flies, etc., from various places.—Larvæ and adults of *Stegomyia fasciata* and *Culiciomyia nebulosa* were obtained from Warri, and larvæ of *Stegomyia fasciata* and *S. sugens* were sent from Lokoja. *Hippocentrum versicolor* was obtained from Obudu. *Mansonioides* received from Onitsha. Dipterous larvæ were found in the stomach of a horse at Yaba.

Dr. J. E. L. Johnston made a large collection of blood-sucking insects from the neighbourhood of Kaduna.

The mosquitoes taken at Kaduna Bridge were *Culex fatigans, C. annulioris, C. duttoni, Anopheles costalis* and *Culiciomyia nebulosa.* Those found at Ubassa were *Culex tigripes, C. duttoni, Stegomyia africana, Culiciomyia nebulosa* and *Ochlerotatus cumminsi.*

At Buga, *Culex duttoni, C. decens, Culiciomyia nebulosa, Stegomyia fasciata, S. sugens,* and *Ochlerotatus cumminsi* were obtained. *Stegomyia fasciata, S. simpsoni, Mansonioides uniformis, Ochlerotatus cumminsi* and *Culiciomyia nebulosa* were taken at Kadamaa.

Three species were caught at Afaka, *Stegomyia simpsoni, S. africana* and *Culiciomyia nebulosa,* and three also at Doka, *Anopheles costalis, Culex duttoni* and *C. tigripes.*

Culiciomyia nebulosa, Culex duttoni, Anopheles costalis and *Stegomyia fasciata* were obtained at Riga Chikun.

Stegomyia sugens and *Culex fatigans* were found at Kakuri, *Mansonioides uniformes* at Kumin Kaduna, and *Culiciomyia nebulosa* at Benawa and Kadi.

Ticks from Kaduna, etc.—*Amblyomma variegatum, Hyalomma ægypticum, Boophilus annulatus,* and *Hæmaphysalis leachi* were taken at Doka.

Hyalomma ægypticum, and *Amblyomma variegatum* were found at Togachi.

At Kaduna Bridge, *Boophilus annulatus* was obtained.

Hæmaphysalis leachi, Boophilus annulatus and *Amblyomma variegatum* were taken at Kadi.

Amblyomma variegatum and *Boophilus annulatus* were found at Riga Chikun and Edemawara.

Tabanids from Kaduna, etc.—*Hæmatopota pertinens, H. lacessens, H.* Sp. nov. and *Tabanus albipalpus* were take at Kaduna River.

Hæmatopota pertinens, H. gracilis, H. (Sp. near *tenuicrus*) and *Tabanus fasciatus* were obtained at Bugai.

Hæmatopota vittata and *Tabanus billingtoni* were got at Afaka.

Hæmatopota gracilis, *H. puniens*, *Tabanus secedens* and *T. socialis* were caught at Doka.

Hæmatopota Sp. nov., similar to that caught at Kaduna River, and *Tabanus tæniola* were found at Kadi.

A large number of non-blood-sucking flies was also collected, including Tipulids, Drosophilids, Anthomyids, Syrphids, Dolichopodids and Tachinids.

Ticks from Aro and Ibadan.—The Ticks received from these places were all identified as *Hæmaphysalis leachi.*

Mrs. Summers-Connal is responsible for most of the identifications of flies. Mr. Neave, at the British Museum, named the Hæmatopotas.

Helminthological.—Filariasis and ankylostomiasis have already been noted.

Worms obtained from cats, dogs, sheep, goat, cattle, monkeys and other animals have been collected, but the identifications are not yet complete. *Fasciola angusta* and an Anoplocephaline have been found in sheep.

Amphiostomes and a Moniezia have been obtained from the ox.

Œsophagostomum, *Trichostrongylus*, an Anoplocephaline and *Uncinaria cernua* have been collected from the goat. *Stephanurus dentatus* and *Œsophagostomum dentatum* have been got from the pig. *Dipylidium caninum*, *Ankylostomum caninum* and *Uncinaria stenocephala* have been found in the dog.

Dipylidium caninum has also been obtained in the cat.

Heterakis vesicularis has been found in the chicken.

Museum specimens.—The following specimens, amongst others, have been received :—

Stomach showing punched out gastric ulcer. Large sarcomatous kidney.

Enlarged and markedly nodulated liver. Great intestine, showing chronic dysentery. Two medium sized gall-stones.

Stomach and contents, yellow fever.

Spleen showing old infarct.

Twelve leeches.

Spleen with numerous plaques on surface.

Ruptured aneurism.

Pyonephrosis.

Intussusception (female, adult).

Tænia saginata.

A Crayfish (from Mr. Davidson, Forcados).

Mud and Corals from sea-bottom (Mr. Cadman).

Donors of material.—The following were good enough to send material to the Institute :—Mr. Boyle, C.M.G., Dr. T. B. Adam, Mr. R. C. Andrew, Dr. Ashton, Dr. Bailey, Dr. Bate, Dr. Beale-Browne, Mr. G. Bell, Dr. Best, Dr. Booth, Dr. Braithwaite, Dr. Breeks, Dr. Brierley, Mr. Cadman, Dr. Chartres, Dr. Chichester, Dr. W. S. Clark, Dr. Cobb, Dr. Cole, Dr. Craig, Dr. Currie, Dr. Dalziel, Mr. Davidson, Dr. Digby, Dr. Ellis, Dr. Ferguson, Dr. Foy, Dr. J. C. Franklin, Dr. E. M. Franklin, Dr. Gallagher, Dr. Garstin, Mrs. Garvey, Dr. Gibson, Dr. Glover, Dr. Graham, Dr. Grant, Dr. G. M.

Gray, Dr. C. G. Grey, Dr. Gordon-Hall, Dr. Hamilton, Dr. Hannington, Major Heard, Mr. Hellard, Dr. Hungerford, Dr. Johnson, Dr. Kauntze, Dr. Laurie, Mr. Lenke, Dr. Leonard, Dr. Macfarlane, Dr. Maclaine, Dr. Mackinnon, Dr. Macpherson, Dr. Manning, Dr. Jackson Moore, Dr. Neale, Dr. Nolan, Dr. North, Mr. Nugent, Dr. O'Dea, Dr. Parkinson, Dr. Peacock, Dr. Pickels, Dr. Pirie, Dr. Pollard, Dr. Porteous, Dr. Quirk, Dr. Ross, Dr. Sapara, Dr. E. L. Sieger, Dr. J. S. Smith, Mr. Buchanan Smith, Dr. Smythe, Dr. Snell, Dr. Stewart, Dr. Suffern, Dr. Swann, Dr. Taylor, Dr. J. W. Thomson, Dr. Tipper, Capt. Walker, D.S.O., Mr. Willans, Dr. A. H. Wilson, the Medical Officer, Kaduna, and the Dispenser, Ondo.

Places from which material was sent.—Material was sent from Abakaliki, Abeokuta, Abo, Afikpo, Ameke, Aro, Badagry, Baro, Benin City, Brass, Calabar, Ebute-Metta, Eket, Forcados, Ibadan, Ikot-Ekpene, Itori, Itu, Kaduna, Kakuri, Kano, Lagos, Nassarawa, Obudu, Ogoja, Okwoga, Ondo, Onitsha, Opobo, Owerri, Owowo, Port Harcourt, Sekondi, Siluko, Warri, Wasimi, Zungeru.

The Staff.—Dr. Connal was on duty until 28th October, when he proceeded on leave. Dr. Coghill returned to duty on 12th October after having served under the Yellow Fever Commission for one year on the Gold Coast. Dr. Seidelin completed his investigations at Yaba on 5th February. Dr. Scott Macfie proceeded home on leave on 16th March, and thereafter took up the duties of Pathologist at Accra. Dr. J. E. L. Johnston worked as Local Investigator under the Yellow Fever Commission from March till October. Sergt. Phipps went on leave on 9th June, and was relieved by Sergt. Pollitt, who arrived on 28th May. Dr. Macpherson, Dr. Paterson and Dr. Mackey, whilst they were in charge of the neighbouring Asylum, were attached to the Institute and did valuable work. Dr. Paterson helped with the yellow fever investigation, the search for trypanosomes in films from pig's blood and in entomology.

Mr. S. A. Cardoso succeeded Mr. Austin as Clerk at the Institute. Mr. Rostico was on duty throughout the year as Laboratory Assistant. The labourers' Staff changed frequently, in personnel but not in numbers.

New Buildings.—A small entomological laboratory and half of a stable were erected during the year.

Acknowledgments.—Thanks are rendered to all those already named on pages 18 and 19, who sent material. Advice and assistance is also gratefully acknowledged to Col. Alcock, Dr. Newham, Dr. Leiper and Dr. J. G. Thomson at the School of Tropical Medicine, London; to Dr. Wenyon, Wellcome Research Bureau, London; and to Mr. Marshall, Mr. Neave and Mr. Edwards at the British Museum.

Meteorological records were kept daily, and forwarded monthly to the Surveyor-General.

An Index and a Table (mosquito-larvæ in Lagos) and three Charts (the temperature of three cattle undergoing treatment for Trypanosomiasis) complete this Report.

A. CONNAL.

H. SINCLAIR COGHILL.

Medical Research Institute,
Yaba, near Lagos,
Nigeria.

MOSQUITO-LARVÆ IN LAGOS.

Month.	Bottles of Larvæ.	*S. fasciata.*	*S. fasc. Culic. neb.*	*S. fasc.* Psychodids.	*S. fasc. Anoph. cost.*	*S. fasc. Ochl. irrit.*	*S. fasc.* Chironomids.	*S. fasc. Cul. neb.* Psych.	*S. fasc. Ochl. irrit. Culic. neb.*	*S. fasc. C. duttoni.*	*S. fasc. C. decens. A. cost.* Psychod.	*S. fasc. Culic. neb. C. tigripes.*	*S. fasc. C. decens.*	*S. fasc. C. tigripes.*	*S. fasc. C. tigripes Cul. neb.* Psychod.	*S. fasc.*	*S. fasc. Culic. neb. Anopheles costalis.*	*Culiciomyia nebulosa.*	*Anopheles costalis.*	*Ochlerotatus irrit.*	*Culex decens.*	*Culex tigripes.*	*Culex duttoni.*	*Culex insignis.*	*Culex grahami.*	*Ochlerotatus nigric.*	Psychodidæ.	Chironomidæ.	*Cyclops.*
January ...	66	59	—	3	1	—	2	—	—	—	—	—	—	—	—	—	—	5	2	—	—	1	—	—	—	—	6	2	—
February ...	57	40	2	2	—	—	—	—	—	—	1	—	—	—	—	—	—	14	3	—	5	1	—	—	—	—	6	1	—
March ...	78	61	1	1	1	—	—	—	—	—	--	—	—	—	—	—	—	16	2	—	2	—	—	—	—	—	4	—	—
April ...	106	85	4	1	—	—	—	1	—	—	—	—	—	—	—	—	—	24	1	—	2	—	—	—	—	—	3	—	—
May ...	127	106	2	4	1	—	—	—	—	—	—	1	1	—	—	—	—	13	3	—	3	1	6	—	—	—	7	—	—
June ...	179	138	6	1	5	—	—	1	—	—	—	—	—	1	—	—	—	34	15	7	2	1	—	—	—	—	3	—	—
July ...	176	130	1	—	3	3	—	—	1	—	—	—	—	—	1	—	—	38	13	5	1	—	—	—	—	—	1	—	—
August ...	144	101	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	34	8	2	—	1	—	—	1	—	—	—	—
September ...	155	107	1	1	—	—	—	1	—	—	—	—	—	—	—	1	—	39	9	5	—	2	—	—	--	—	3	—	1
October ...	153	92	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	49	13	6	—	2	—	1	—	1	2	—	—
November ...	149	110	2	4	3	2	2	—	—	—	—	—	—	—	—	—	1	27	9	8	1	2	2	—	—	—	10	2	—
December ...	132	106	6	1	3	2	—	—	—	2	—	—	—	—	—	—	—	20	8	4	1	4	4	—	—	—	5	—	—
	1,522	1,135	30	18	17	7	4	3	2	2	1	1	1	1	1	1	1	313	86	37	17	15	12	1	1	1	50	5	1

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